Claims

We claim:

1. A method for transcoding an input video, comprising:

determining a plurality of sets of rate values and a corresponding plurality of sets of distortion values, there being one set of rate values and one corresponding set of distortion values for each of a plurality of components in an output video corresponding to the input video; and

allocating bits to each of the plurality of components in the output video according to the associated set of rate values and the associated corresponding set of distortion values.

2. The method of claim 1, in which a first bit rate of the input video is greater than a second bit rate of the output video, and further comprising:

minimizing a total distortion of the output video subject to the second bit rate.

3. The method of claim 1, in which the components further comprise:

requantizing the input video to the output video;

inserting resynchronization markers in the output video; and

inserting intra-coded blocks in output video.

4. The method of claim 2, in which the second bit rate comprises the plurality of sets of rate values, and the total distortion comprises the corresponding plurality of sets of distortion values.

5. The method of claim 1, in which each set of rate values and the corresponding set of distortion values is expressed as a rate-distortion function, and the allocating further comprises:

equalizing slopes of the rate-distortion functions.

6. The method of claim 5, wherein the equalizing further comprises:

differentiating discretely each of the rate-distortion functions to obtain the equal slopes.

7. The method of claim 6, in which the differentiating is performed using two sample points of each rate-distortion function.

8. The method of claim 5, further comprising:

examining the slope of each rate-distortion functions; and

adjusting a rate of the allocating of the bits to each component based on the slopes of the rate-distortion functions, and any changes in the second bit-rate while allocating bits to each of the plurality of components.

9. The method of claim 8, in which the examining further comprises:

identifying a first component with a smallest absolute derivative value of the corresponding rate-distortion function, and a second component with a largest absolute derivative value of the corresponding rate-distortion function.

10. The method of claim 9, in which the second bit rate increases while allocating, and the allocating further comprising:

increasing a number of bits allocated to the second component with the corresponding largest absolute derivative value.

11. The method of claim 8, in which the second bit rate decreases while allocating, and the allocating further comprises:

decreasing a number of bits allocated to the first component with the corresponding smallest absolute derivative value.

12. The method of claim 8, in which the second bit rate remains constant while allocating, and the allocating further comprises:

increasing a number of bits allocated to the second component with the corresponding largest absolute derivative value; and

decreasing a number of bits allocated to the first component with the corresponding smallest absolute derivative value.

13. The method of claim 8, in which the rate of adjusting corresponds to a rate of change of the second bit-rate while allocating the bits.

14. The method of claim 8, in which the rate of adjusting corresponds to a magnitude of the slope of each rate-distortion function.

15. The method of claim 1, in which the allocating operates on groups-of-frames of the input video to account for inter-frame dependencies in the input video.